SCHEDULE G

REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE INSTALLATION OF STREET LIGHTING

This is Schedule G of the City of
Vernon Subdivision and Development
Servicing Bylaw No. 3843, 2008

_____*"Patti Bridal"*_____
City Clerk

SCHEDULE G – BYLAW NO. 3843

REGULATIONS, STANDARDS AND SPECIFICATIONS FOR THE INSTALLATION OF STREET LIGHTING

1.00 GENERAL

Street Lighting To Be Provided By Applicant

1.01 The Applicant shall provide street lighting for all new development including all service wiring, bases, poles, luminaires, lamps, photo cells, control equipment and all related appurtenances consistent with the regulations, standards and specifications set out in this Bylaw, the most current Master Municipal Contract Documents (MMCD) and the requirements of the Provincial Inspector of Electrical Energy. Where the applicant is required to upgrade the road adjacent to their lands this upgrade shall include provision of street lighting as required to provide illumination and uniformity to City standards. These governing documents shall take precedence in the following order:

1) Provincial Inspector of Electrical Energy\
2) Canadian Electrical Code, the most recent and adopted edition.
3) This Bylaw, as amended
4) MMCD, current edition, Platinum

Approval of Engineering Drawings Required Prior To Construction

1.02 A separate set of engineering drawings showing detailed design of the necessary works shall be approved by the City Engineer before commencement of construction. These drawings must include: Street lighting contours, the B.C. Hydro transformer and service location(s), the service panel(s) location(s), and the balance phased wiring layout and pole phase designations.

The street lighting system shall be laid out in accordance with the Canadian Standard Practice For Street and Highway Lighting.

Permit Fees To Be Paid By Applicant

1.03 The Applicant shall be responsible for obtaining all required electrical permits, arranging for all electrical inspections covering his work and paying all fees for such permits.

2.00 DESIGN CRITERIA

Street lighting shall be designed to meet the required levels of illumination and uniformity at the lowest annual cost to the City. Street light material selection must be based on minimizing long term annual costs to the City, including replacement costs and maximize service life while minimizing energy demand.

Levels of Illumination

2.01 The average levels of illumination, luminance and uniformity shall conform to IES RP-8, current edition, standards for all urban section roads. Rural roads do not have the same conflict issues and therefore are not required to provide continuous street lighting. Rural roads must provide street lighting at all locations where there is an increased potential for conflict. These include but are not limited to: intersections, sharp bends and cul-de-sac locations. The applicant's engineer is required to model the photometrics of the proposed street lighting to verify both illumination and uniformity and provide the City with a copy of this information for review and acceptance.

All new development is required to provide the ability for future dimming of street lights by approved means (7 pin photo cell receptacle, or approved equal) during non-peak hours.

Pole Locations

2.02 In general, pole locations will be determined by the Electrical P.Eng. as part of the electrical design and shall be typically preferred to be installed as follows:

Arterial Highways - opposite or staggered spacing or center island median where available;
Collector Highways - staggered spacing;
Rural Highways – on existing utility poles
Local Highways - spaced one side of streets behind the sidewalk
Hillside Highways - spacing based on road width and classification to meet required levels and ratios. Poles are to be located on the uphill side of the road where possible regardless of sidewalk location.
Walkways at the intersection of roads and between roads where a straight line of sight between roads or other walkway light is not present.

Poles located where lots front the road shall be located within 0.6 metres of the property corners and shall not conflict with driveways, underground services and fire hydrants.

In areas where overhead utilities exist, street lights in general are to be on the opposite side of the road. In extreme circumstances existing lighting mounted on utility poles may be maintained and included in the illumination and uniformity calculations if its location conforms to the required spacing of the approved design. The addition of new utility poles with lights is permitted.

Codes, Rules, Standards and Permits

2.03 General

Equipment, installation, wiring methods, and materials used shall be in accordance with the latest edition, including amendments, of the Rules and Regulations for the

installation and maintenance of electrical equipment. Work shall also be in accordance with all applicable Municipal codes and regulations, Provincial Statutes in effect at the site, and as required by the Fire Chief, Emergency Services, and Work Safe BC Acts, hereinafter called the Code, Rules, Standards and Permits.

Code

Canadian Electrical Code, the most recent and adopted edition issued.

Rules

- Work Safe BC;
- Canadian Standards Association;
- Utility Companies; and
- Regulations issued by Municipal, Provincial, and Federal authorities.

Standards

- IES RP-8 American National Standard for Roadway Lighting; 2014 or most recent;
- TAC
    - Guide for the Design of Roadway Lighting;
    - Illuminations of Rural Intersections;
- AASHTO Standard Specifications for Structural Support for Highway Signs, Luminaires, and Traffic Signals;
- CAN3-CSA22.3 No.7 Underground systems;
- CAN3-CSA22.3 No.1 Overhead systems; and
- Master Municipal Construction Document (MMCD) Specifications and Standard Detail Drawings, Plus Supplementary Specifications and Design Drawings.

Maintain all clearances from hydro poles as required by: BC Hydro, Work Safe BC and the Canadian Electrical Code.

Wherever the drawings or specifications call for material, workmanship, arrangement or construction of a superior quality than is required by the Code, Rules and Standards, the drawings and specifications shall prevail. Otherwise, should there be a conflict between the Code, Rules and Standards and the drawings and specifications, the Code, Rules and Standards shall prevail.

Permits

The Applicant shall obtain, and pay for all permits, and arrange for all electrical inspections covering the work, and pay all other fees and charges, and make all deposits that are in any way connected with the installation of the systems specified as shown on the Drawings. The Applicant shall give all necessary notices to authorities having jurisdiction, and shall be responsible for keeping all applicable public ordinances.

Scheduling B.C. Hydro and Power Authority shall be the Applicant's responsibility. Systems shall be compatible with power services available. Where costs are incurred with B.C. Hydro and Power Authority in installing the light system, these shall be considered as part of the cost of the system.

Before acceptance of any part or all of the system, it shall meet the requirements of Schedule H. Record Electrical engineered drawings labeled E1, E2, etc. of the street lighting system shall be furnished to the City Engineer prior to acceptance. The information shown shall be pole locations and location and size of all conduits and conductors, together with any other pertinent information.

Before acceptance of any work by the City Engineer, a Certificate of Final Inspection and Declaration b the governing electrical authorities showing that the installation is unconditionally approved must be received. A jobsite copy of the Electrical Inspection Bulletin 2.10.0 is also to be provided or as approved per Rules 2-004 of the Canadian Electrical Code.

2.04 Connection to Utility

An allowance for a minimum of 8 street lights per electrical connection shall be made and future extension of the street lighting system should accommodate this requirement.

Each connection to B.C. Hydro will be made to a main distribution service panel located at a lamp standard as shown on MMCD drawing E7.2.

3.00 MATERIALS

3.01 General

Electrical materials used in the street lighting system shall be new and shall be approved by and bear the label of the Canadian Standards Association. The service life and replacement costs for all streetlight components must be provided to the City by the Applicant to establish the sustainability of the proposed works. The City reserves the right to refuse installation of works which exceed City standards based on a lack of financial sustainability. Alternate lighting systems which reduce energy consumption are encouraged but must be demonstrated to provide long term savings.

3.02 Street Light Poles and Spares

All streetlight and traffic signal poles shall be designed to withstand a 85 mph wind speed. The style of pole to be used in any area of the City must conform with City design requirements for the specific area. The applicant is required to confirm the type of street light pole required for any application as established by the City.

Decorative powder coated poles are required for new development in: Historic Downtown City Centre, Area 3 Hillside, and in Neighbourhood Centres as defined in

The City Centre Neighbourhood Plan, adopted November 2011. Standard galvanized poles may be utilized in infill locations where all existing poles are of similar type. Decorative metal poles shall be powder coated as per ASTM G7 and ASTM D2247 with the colour approved by the City Engineer. The minimum pole height is 15' (4.57m) for walkways and 20' (6.10m) for roads. Metal poles shall be a minimum of 5" (127mm) diameter round one piece seamless extruded aluminum having a 0.150" (3.8mm) wall thickness welded to both the top and bottom of a reinforced base cast from zinc rich aluminum. (Taller poles require an increased diameter and wall thickness.) A maintenance opening 2"x4 1/2" (51x114mm) is required centered 20" (508mm) from the bottom of the anchor plate. The base bolt opening dimension shall conform to the required pole base bolt circle dimensions. All decorative metal poles shall include a base cover. All maintenance openings are required to include up to date anti-theft locking and entrance prevention systems. Applicants are required to contact Engineering to confirm acceptable systems.

Base covers shall be fluted powder coated two piece made from cast 356 aluminum. The base cover shall be a minimum of 38 13/16" (986mm) high and have 4"x10" (102x254mm) maintenance opening.

Post top mounting is only permitted for "Square lantern" style luminaires. All other styles require a decorative arm. Two arm types are acceptable. Straight arms shall be made of powder coated 2 3/8" (60mm) OD welded aluminum tubing and be a minimum of 36" (914mm) in length CRH-1A or approved equivalent. Curved arms shall be powder coated bent aluminum tubing 6061-T6 1 5/8" (41mm) OD with a 24" (610mm) diameter CN5-1A or approved equivalent.

Banner arms, landscape, Irrigation mountings and all other proposed appurtenances where specified, and as required in typical road section standard drawings as defined in Schedule O of this bylaw, must be included in the design from the factory and approved by the City Engineer.

Spares
The following number of fully supplied spare street lights shall be provided as follows:

Number of fixtures	Number of spares
0-9 Street lights	0 spare
10-20 Street lights	1 spare
>Than 20 Street lights	2 spares

3.03 Conductors

All conductors shall be copper and *minimum* 10 AWG *and* shall be stranded. #12 AWG stranded must be used to feed each fixture from the hand hole to the LED.

All insulated conductors shall be colour coded. White shall be used for the neutral conductor, *black and red for each phase and green for ground.*

Conductors run in rigid PVC conduit or in the interior of street light poles shall be wire type as listed in Table 19 of the Canadian Electrical Code for use in raceways (wet location). Adequate slack shall be provided in the pole to permit removal of connected wires and fusing through the hand hole for maintenance.

In no case shall the conductor be less than 10 AWG.

3.04 Conduit

Conduit size shall be minimum 50 mm diameter RPVC and conform to CSA C22.2 No. 211.2. Rigid PVC conduit and fittings shall bear a CSA Certification label or other proof of CSA certification. RPVC conduit shall be installed in strict accordance with the manufacturer's recommendations, using CSA certified cement. The conduit shall not be bent in the field. Only factory bends shall be acceptable. Utility service wiring shall be enclosed in a 50mm conduit from the source to the main distribution service panel.

Luminaires

3.05 All new luminaires are to be LED (Light Emitting Diode) fixtures with a colour temperature of 3000 Kelvin in all residential areas for local and collector roads, 4000 Kelvin in commercial and industrial areas and on all major intersections and arterial roads four lanes or wider, as necessary to provide acceptable illumination. Luminaires must ensure energy efficient provision of the required illumination and uniformity and shall have a BUG (Backlight, Uplight & Glare) rating of UO (Up light Zero).

Luminaires shall be flat glass LED for streets and intersections. Cobra Head Fixtures are to be used for galvanized poles. LED Cobra head fixtures must be either General Electric or approved equivalent. Photocells shall be Intematic LED 4536SC, or approved equivalent. There shall be one photocell at the main distribution service, with each subsequent cobra head fixture having a 7pin receptacle and shorting cap.

The luminaire shall contain an internal optical module(s) that consists of a highly specular reflector system that will not corrode, peel, or fade under normal operating conditions.

LEDs mounted to an aluminum clad circuit board attached to the housing to maximize heat transfer, a single flat translucent, tempered glass lens to maximize efficiency of light output and to minimize dirt depreciation – **Exposed optics are not acceptable**. The lens shall have a single channeled silicon gasket and held in place by a removable cast aluminum bezel, without the need for caulking to meet IP66 requirements. The driver, optic assembly and housing shall be from the same manufacturer.

Luminaire hoods shall be powder coated die cast A360 aluminum of the “Dolmus DOS, Mission 100, or K829 Aurora” style or approved equivalent or black powder coated die cast A 356 “Square lantern L40-SG with chimney glass, Provincial PRO 400-ORH, or Empress K601 with chimney glass” style or approved equivalent.

Street light dimming system provisions must be incorporated into the proposed luminaries. Fixtures shall be CSA approved and shall be GE or approved equivalent.

All fixtures to come with: 7 Pin shorting Cap, tool less entry, and 20Ka/10kV surge protection.

3.06 Junction Boxes

Junction boxes shall be PVC or concrete as shown on MMDC Standard Drawing No. E2.1 and E2.2. PVC boxes with street lids shall be used in sidewalk and boulevard areas only. Concrete boxes with street lids shall be used in all areas subject to vehicle traffic. There shall be one junction box per street light. All steel lids must be bonded. All junction boxes located in sidewalks are to be pinned a minimum of 4 times. All splices must be in JB's utilizing marretts which shall be scotch coat dipped then taped. All junction boxes are required to include up to date anti-theft locking and entrance prevention systems. Applicants are required to contact Engineering to confirm acceptable systems.

3.07 Ground Plates

CSA approved galvanized ground plates shall be installed beneath the pole base supporting the main distribution service as per MMCD drawing E7.10.

3.08 Connectors

Insulated connectors shall be Scotchlok as manufactured by Minnesota Mining and Manufacturing Co. Ltd., or approved equivalent. For conductor combinations too large to use Scotchlok connectors, a *taped over* solderless line connection shall be used, such as connector CL2 manufactured by Thomas & Betts Ltd., or approved equivalent. Bare copper lug used for connecting ground conductor to ground studs in lighting pole hand hole shall be Thomas & Betts 54106 full compression lugs, or approved equivalent. The connector serving a ground rod shall be Burndy type GAR, or approved equivalent.

3.09 Fusing

There shall be one in-line (cartridge type) fuse per street light, located within the pole and accessible through the hand hole as per MMCD drawing E7.11.

3.10 Pole Bases

Concrete bases for poles shall be as shown on MMCD drawing CE1.3 and CE1.4. Pole bases shall be situated so that the base top is 50 - 100 mm above the adjacent sidewalk or curb, or higher if required to suit steep boulevard grades. The pole base for the main distribution service shall have three 50mm conduits as shown on MMCD

drawing CE1.3 and CE1.4 Base Type C for single and double davit and Type C1 for service base poles.

Service base shall be powder coated stainless steel to MMCD standard detail drawing E4.21 specifications. It must be mounted to the required base utilizing a rubber gasket and silicone edge sealing. Mounting details are to be as per standard detail drawings E7.2 and E7.4.

3.11 Service Kiosks

The use of stand alone streetlight kiosks are encouraged for use with decorative lighting. Kiosks must meet requirements of the Canadian Electrical Code and be constructed to meet NEMA 4 standards. They must be constructed of marine grade 5052-H32 sheet aluminum at least 1/8" thick with all exterior seams continuously welded and powder coated to the same colour and standards as the decorative poles. Doors must be fabricated from a single sheet of aluminum with wrap around return, ¼" thick continuous seal, at least 3 hidden hinges and a 3 point contact door handle. Cabinet ventilation must be engineered to move filtered air in through the cabinet with ventilation holes 1/8" or less in diameter. Kiosk size is variable and must be adequate to accommodate the necessary works including a meter and breaker panel. A metering window and a photocell window made of at least ½" thick Lexan Polycarbonate affixed to the door by stainless steel pem studs and a rubber o-ring gasket is required. The photocell window must be positioned to face north. The service kiosk is to be mounted to the required base using a rubber gasket and silicon edge seal. Kiosks by Valid or Danby or approved equivalent.

3.12 Leveling Shims

Street light poles shall be mounted on the pole base studs using leveling shims beneath the pole plate as shown in MMCD Standard Drawing No. E4.4. Poles shall be adjusted to a plumb position using the leveling shims. A maximum of 4 leveling shims is permitted, see MMCD Standard Drawing No. E4.4, item E.

4.00 WORKMANSHIP

4.01 Installation

Conduits shall be installed at a constant depth under sidewalks wherever possible or on an approved alignment as shown on the approved construction drawings. Conduits under existing paved roads, driveways or sidewalks shall be installed by open trench construction, unless the City Engineer gives his express written consent for tunneling. Service line conductors and all other electrical components shall be installed in conformance with the standard drawings in the Canadian Electrical Code. A conduit under curb or sidewalk shall be buried in a trench with the centre line not less than 300 mm below top of curb or sidewalk. If no curb or sidewalk is required in future, the conduit shall be buried 900 mm below finished grade of centreline of road; and all road, lane and industrial and commercial driveway crossings, the conduit shall be buried not

less than 900 mm below top of crossing. If the top of crossing is covered by concrete slab, the depth of trench may not be less than 750 mm below the top of crossing.

In all trenches, the conduit shall be snaked slightly to permit expansion and contraction.

All ducts shall be sand bedded to a minimum of 300 mm below and 300 mm above the ducts. All trenches shall have yellow warning tape located 300mm below the finished grade.

Bases shall be constructed and installed as shown on the standard drawings. The standards shall be erected plumb, using shims if required.
Luminaires shall be securely fastened to the lighting poles and oriented to produce the required light distribution.

4.02 Restoration

All roadways, lanes, driveways, boulevards, and other areas traversed by trenches shall be returned to their original conditions or better by the Applicant.

5.00 STANDARD DRAWINGS

5.01 The following City of Vernon Standard Drawings shall compliment and supercede the MMCD drawings that form part of this schedule.

Drawing No.	Drawing Description
600-1	Ornamental Street Light Pole *(Bylaw 5797)*

5.02 The following MMCD drawings are attached from the MMCD Platinum book for convenience and are not to be considered a complete list of applicable MMCD drawings. Underlined notes following specific drawings indicate required changes to that MMCD standard.

Drawing	**Proposed MMCD Replacement Electrical Drawing**
Standard Light Pole Base	CE1.3 Type C, C1, C2, and C3 Trapezoidal Shape Concrete Bases
Standard Light Pole Base	CE1.4 Type C, C1, C2, and C3 Trapezoidal Shape Concrete Bases
Round Plastic Junction boxes	E2.1 Round Plastic Junction Boxes
Type 37 & 66 Concrete Junction Box	E2.2 Type 37 & 66 Concrete Junction Box
Street Light Pole	E4.1 Solid Non Sectional Galvanized Luminaire Pole Type 2 Pole

Luminaire Wiring in Service Hand hole	E7.11 Luminaire Wiring in Pole Hand hole
Underground Dip service	E7.1 Underground Dip service
Service Base	E7.2 Service Panel in Service Base (Mounting Details)
Service Panel in Service base	E7.4 60A streetlight and 100A Streetlight/Traffic Signal Service Panel in Service Base (Panel Details)
Service Ground Plate	E7.10 Service Ground Plate Installation Detail
Pole Connection Details	E 4.2 Post top Luminaire Poles (Post Top Pole Bolt Kit)
Main Service Panel in service Base	E7.2 Service Panel in Service Base (Mounting Details)